

A REVIEW ON HERBAL COSMETICS IN INDONESIA**NASRUL WATHONI*, ANI HAERANI, NIA YUNIARSIH, RETNO HARYANTI**

Department of Pharmaceutics, Faculty of Pharmacy, Universitas Padjadjaran, Jatinangor 45363, Indonesia

Email: nasrul@unpad.ac.id*Received: 25 Jun 2018, Revised and Accepted: 21 Jul 2018***ABSTRACT**

Nowadays, Herbal cosmetic is growing rapidly as most women prefer natural products rather than chemicals products for their personal care. Herbal cosmetic contains natural nutrients to improve and provide consumers satisfaction due to relatively fewer side effects compared to synthetic cosmetics. Indonesia is one of the biggest supplier's countries for herbal raw materials in cosmetic products. Many plants are available naturally as well as different uses that can be made as basic ingredients for cosmetic preparations, such as onion *dayak* bulb, *kemuning* leaf, *pegagan*, *kecombrang*, red betel, pecan, and sweet root. This review aimed to provide information on plants in Indonesia based on the phytochemicals contents that can be formulated into various categories of cosmetic preparations, such as skin care, hair care, anti-aging, skin whitening, and antioxidant.

Keywords: Herbal cosmetic, Indonesia, Phytochemicals, Natural products

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INTRODUCTION

The word cosmetic comes from the Greek word "*Kosmetikos*" which means having strength, set skill decorative [1]. Cosmetic is a very diverse product, such as cream, perfumes, lotions, skin cleansing products, and decorative cosmetics sector. Natural substances are extensively used in cosmetic preparations [2]. As there is an increasing interest in understanding cosmetic action mechanisms to achieve more sophisticated design targets, like skincare products [3]. Skincare is one of the cosmetic products grouped as Cosmeceutical. It means this product has measurable biological performance in the skin, like a drug, but is regulated as a cosmetic; and usually is used for various treatment such as wrinkles, anti-aging, hyperpigmentation and hair damage [4]. Cosmeceutical industry is growing everyday, and improving by new technology such as nanotechnology which has good opportunity to alter the Cosmeceutical market [5-7] dramatically.

Herbal cosmetic products are formulated using various cosmetic ingredients allowed to form a base from one or more herbal ingredients and provide the desired cosmetic benefits [8, 9]. To improve health and provide patient satisfaction, the usage of herbal cosmetics is suggested as it has fewer side effects compared to synthetic cosmetics.

Indonesia is the second richest country in the world in terms of biodiversity. There are about 30,000 species that have been identified. 950 species of them are known to have a biopharmaceutical function and potential as a drug, health food, nutraceutical, both for humans, animals and plants [10].

The method of writing reviews that used by literature study with techniques to analyze the contents of libraries related to herbal cosmetics in Indonesia. A fact-finding that supports written data and materials for reference authors takes material from various journals of 1979-2018.

The purpose of this review is to provide information on plants in Indonesia that can be formulated into various categories of cosmetic preparations in accordance with the phytochemicals substances contained in the plant. So it can be used as a reference in making herbal based cosmetic preparations.

Development of herbal cosmetics in Indonesia

Herbal medicines are traditionally used in the treatment and skin care which consists of herbs and spices from high-level plants, microbial biomass, and various extracts. Effects of certain therapeutic can be obtained from a complex of various natural compounds as a guide of ancient herbalism and medical practice [11,

12]. Traditional Chinese medicine and Ayurveda are regarded as a key element of modern herbal medicine and skin care [3]. In Indonesia, traditional herbal medicine, known as *Jamu* has been practised for many centuries in the Indonesian community to maintain good health and treat diseases. *Jamu* is a traditional herbal treatment made in the form of capsules and powders [13].

Currently, a popular trend is back to the nature and using herbs as the main ingredient of skin care formulations due to natural ingredients are more biocompatible to the body than synthetic materials. The synthetic materials in cosmetic products can cause dangerous effect especially for long-term use, including atrophy, carcinogenesis, and ochronosis [14]. Cosmetics from natural sources are considered eco-friendly, better and safer [15]. Plants as one of the natural sources of cosmetics ingredient can be used to synthesize some useful inorganic materials that is usually called as green synthesis [16].

Herbs are made from original ingredients in plants, leaves, roots, fruits and flowers which have properties for healthy and beauty [17]. The content of active chemical compounds in plants are alkaloid, flavonoid, terpenoid, steroid, tannin, and saponin which can be determined by phytochemical screening [18].

The development of herbal cosmetics in Indonesia is growing rapidly. The cosmetics industry is one of the priorities plays as a major role in the Indonesian economy. It is because Indonesia has a wealth of natural beauty materials and a population reach 260 million people and most of the women prefer natural products compared to synthetic products to improve their beauty and healthy [19]. The valid data from Ministry Industry of Indonesia showed sales of cosmetics in 2012 reached 688.7 million USD, on the year 2013 rose to 795.2 million USD which means an increase of 15 percent. Meanwhile the value of the market of cosmetics on 2014 reached 4.2 billion USD and in 2015 grew by 9% to 4.6 billion USD. In addition, Indonesia is one of the world's leading suppliers of raw herbal materials and the world's largest cosmetics products, with Indonesia's market share in the world reaching 13% or 2 billion USD in 2007 [10]. The demand of world import markets for drug and cosmetic products are increasing rapidly, 17% and 15% annually in average. Herbal cosmetics industries in Indonesia have a great opportunity to become one of the largest countries due to the considerable market opportunities [10].

Indonesian plants for herbal cosmetics

Some plants in Indonesia have a high potential as a raw material in the manufacture of herbal cosmetics preparations are listed in table 1.

Table 1: Cosmetic category of some plants in Indonesia with Its phytochemical content

Category	Plant	Phytochemical content	Reference
Antioxidants	Tomato (<i>Solanum lycopersicum</i>)	Lycopene, Carotenoids	[11]
	Jamblang (<i>Syzygium cumini</i>)	an alkaloid, flavonoids, resins, tannins, and essential oils	[22].
	Dayak onion (<i>Eleutherine Americana Merr.</i>)	The phenolic compounds of the naphthoquinone groups such as elecanacin, eleutherin, isoeleutherin, eleutherol and eleutherinone	[23]
	Kersen (<i>Muntingia calabura</i>)	Flavonoid, saponin, triterpene, steroid, and tannin	[24]
Skincare	Kemuning Leaf (<i>Murraya paniculata</i>)	Essential oils, alkaloid, flavonoid, and tannin	[25]
	Kunyit (<i>Curcuma Domestica Val.</i>)	Curcuminoid consisting of curcumin, desmetoxicumin, and bisdesmetoksikurkumin as well as volatile oils, fat, carbohydrate, protein, starch, vitamin C, iron, phosphorus, and calcium	[25]
	Kenanga flowers (<i>Cananga odorata</i>)	Benzoic, farnesol, geraniol, linalool, benzyl acetate, eugenol, safrol, cadinene and pinene	[26]
Anti aging	Pegagan leaf (<i>Centella asiatica</i>)	Amino acids, beta carotene, fatty acids, flavonoids, terpenoids, alkaloids, saponins	[27]
	Kelor Leaf (<i>Moringa oleifera</i>)	Ascorbate acids, β -carotene, tocopherol acid, flavonoids, phenolics, carotenoids, hydroxylamine acid derivatives, and flavonoids	[28]
Lip Color	Kecombrang (<i>Etlingera elatior</i>)	Anthocyanidins	[29]
	Dayak onion (<i>Eleutherine Americana Merr.</i>)	The red pigment of the quinone class	[30, 31]
Liquid Bath Soap	Aloe vera (<i>Aloe vera Linn</i>)	Antibacterial activity against Gram (+) and Gram (-) bacteria	[32]
	Red Betel leaf (<i>Piper crocatum Ruiz and Pav</i>)	Antibacterial Activity	[33]
	Kumis kucing leaf (<i>Orthosiphon aristatus</i>)	Activities antibacterial against <i>Staphylococcus aureus</i>	[34]
Hair Care	Olive oil (<i>Olea europaea L.</i>)	Triglycerides esters of oleic acid and palmitic acid and other fatty acids, such as squalene (up to 0.7%) and sterols (about 0.2% phytosterol and tocopherol)	[35]
	Coconut (<i>Cocos nucifera</i>)	Saponin	[36]
	Celery (<i>Apium graveolens</i>)	Vitamin A, Vitamin B, sodium, iron, and calcium	[37]
	Kemiri (<i>Aleurites moluccana</i>)	Minerals such as phosphorus, calcium, potassium, magnesium	[38]
Skin Whitening	Akar manis (<i>Glycyrrhiza glabra</i>)	Triterpene, saponin, and flavonoid	[40]
	Bengkuang (<i>Pachyrhizus erosus</i>)	Vitamin C and Vitamin B	[48]
	Temulawak (<i>Curcuma xanthorrhiza</i>)	Vitamin C	[49]

Antioxidants

Tomato (*Solanum lycopersicum*): Tomato contains carotenoids and lycopenes with powerful antioxidant and anti-carcinogenic properties. Carotenoid is most effective for capturing reactive oxygen species, and lycopene is important for reducing lipid peroxidation and preventing erythema from ultraviolet radiation orders [20]. Tomatoes can be the basic ingredients of cosmetic preparations such as peel off gel mask and cream.

Jamblang (*Syzygium cumini*): Jamblang plant contains chemical compounds such as alkaloid, flavonoid, resin, tannin, and essential oils [21]. Jamblang fruit has high antioxidant activity because of its natural anthocyanin content. Anthocyanins are one of the most important flavonoid subgroups for plants. High flavonoid content makes Jamblang fruit beneficial to the health of the body [22]. Jamblang can be formulated as a mask, gel, and lotion or antioxidant cream.

Dayak Onion (*Eleutherine Americana Merr.*): Dayak onions are from Borneo and one of the Indonesian medicinal plants. Dayak onion is containing phenolic compounds of the naphtha quinone-like group elecanacin, eleutherin, isoeleutherin, eleutherol, and eleutherinone. Phenolic compounds have been known to have very strong antioxidant effects [23]. Dayak onions can be used as basic ingredients of antioxidant cosmetic preparations such as gels, masks, and antioxidant lotions.

Kersen (*Muntingia calabura*): Kersen is a plant that can be easily found all province in Indonesia. Kersen contains various bioactive

compounds namely flavonoid, saponin, triterpenes, steroid, and tannin. The high component phenolic compounds correlated to strong antioxidant activity. Therefore, it can be formulated as an antioxidant cosmetic preparation [24].

Skin care

Kemuning leaf (*Murraya paniculata*): The yellow leaves of Kemuning can be used for skin beauty because of its chemical compounds, including secondary metabolites such as essential oils, alkaloid, flavonoid, and tannin. These compounds are able to moisturize and brighten the skin. Kemuning leaves play a role in helping to overcome rough skin so the skin will be smoother [25].

Kunyit (*Curcuma Domestica*. Val.): Kunyit is used for skin beauty and protecting the skin from the sun exposure. Kunyit has curcuminoid such as curcumin, desmetoxicumin, bisdesmetoxicurcumin and other beneficial agents (volatile oils, fat, carbohydrates, proteins, starch, vitamin C, iron, phosphorus, and calcium). Curcumin is a yellow dye contained by turmeric, an average of 10, 29 %, has a broad spectrum of biological activity such as antihepatotoxic, antibacterial and antioxidant. Therefore, Kunyit is able to be used for traditional medicine and skin care. Kunyit also helps to overcome the destruction of skin cells with lifting dead skin cells and overcoming skin diseases. It can be used to soften, smoothen and brighten the skin [25], therefore, Kunyit has the potential to be formulated too as cosmetics preparations.

Cananga flowers (*Cananga odorata*): Cananga flowers can be used for skin brightening with its chemical compounds such as benzoic,

farnesol, geraniol, linalool, benzyl acetate, eugenol, safrol, cadinene and pinene. The flowers produce lang oil and well known as 'yang-yang' oils. This oil usually used as perfumes for the cosmetic industry. It is useful as effective aromatherapy to eliminate body odors, to shrink pores, scaly skin, and keep the skin moisture. Cananga flowers can be used also as a natural material of body scrub [26].

Anti-aging

Pegagan (*Centella asiatica*): *Centella* is rich in amino acids, beta-carotene, fatty acids, flavonoid, terpenoid, alkaloid, saponin, and several other nutrients. The extraction of these vines (commonly called made cassoside) can alleviate inflammation, accelerate wound healing, stimulate the formation of new cells and increase collagen production. Therefore, *Pegagan* is very useful as an ingredient for anti-aging cosmetics [27].

Kelor leaf (*Moringa oleifera*): *Kelor* leaves contains vitamin C seven times greater than oranges, vitamin A is ten times larger than carrots, calcium is seventeen times larger than milk, protein is nine times larger than yogurt, potassium is fifteen times greater than bananas and iron twice larger than a bay. It is also contains ascorbic acid, β -carotene, tocopherol acid, flavonoids, phenolics, carotenoids, hydroxylamine acid derivatives, and flavonoid so that *kelor* leaves can be used as a natural antioxidant source. Therefore, it can be used as anti-aging agents in cosmetics preparation [28].

Lip color

Kecombrang (*Etlingera elatior*): *Kecombrang* is one of the *Zingiberaceae* family that have strong antioxidant activity. The color of the flowers is caused by anthocyanin flavonoid, a pigment that can be used as a natural dye and replacing synthetic dyes for lipstick preparations [29].

Dayak bulbs (*Eleutherine Americana* L. Merr): *Dayak* bulbs contains secondary metabolite compounds including alkaloid, tannin, flavonoids, phenolic, steroid and glycosides such as naphthopyran, eleutherosid B, isoeleutherin, eleutherin, and eleutherinol [30]. These compounds are a potential source of biopharmaceuticals and can be developed as modern medicinal plants in human life. In addition, the red color of *Dayak* bulbs can also be used as a coloring material for cosmetics. It is derived from compounds of the quinone class. The color pigments contained in the onion bulbs can be potentially used as a natural dye for lipstick [31].

Liquid bath soap

Aloe vera (*Aloe vera* Linn): Leaves extract of *Aloe vera* in liquid soap formulations against some pathogenic bacteria. The liquid soap preparation of *Aloe vera* leaf extract has activity as antibacterial to Gram-positive bacteria (*S. Aureus*, *B. Subtilis*, and *B. Cereus*) and Gram-negative bacteria (*S. Typhi*, *P. Mirabilis*, *P. Aeruginosa*, and *E. Coli*) [32].

Red betel leaf (*Piper crocatum* Ruiz and Pav): Red betel leaf can be used in liquid soap due to its antibacterial activity. Liquid soap base can be prepared by reacting a fatty acid and potassium hydroxide. Red betel leaf contains the fatty acids namely crude palm oil. Crude palm oil contains carotenoid, tocopherol, and tocotrienol. Previous study showed that extracts ethanol of red betel leaf has antibacterial activity against *Staphylococcus aureus* and *Escherichia coli* at a concentration of 2.5% [33].

Kumis kucing Leaf (*Orthosiphon aristatus*) from family *Lamiaceae* has an antibacterial activity because of its chemical compounds such as alkaloid, flavonoid, tannin, polyphenol, and saponin. The leaves extract of *kumis kucing* have antibacterial activity against *Staphylococcus aureus* that can be used in liquid soap preparation [34].

Haircare

Olive oil (*Olea europaea* L.): Olive oil consists of a mixture of triglycerides of oleic acid ester, palmitic acid and other fatty acids, such as squalene (up to 0, 7 %) and sterols (about 0.2% phytosterol and tocopherol). Olive oil acts as hair moisturizer hair and skin irritation reducer. In addition, vitamin E in olive oil protects a hair loss [35]. Thus, olive oil is good to be used in cosmetic hair preparations such as gel and liquid hair tonic.

Coconut (*Cocos nucifera*): Coconut is an important member of the *Arecaceae* (palm) family. Coconut is a large palm, growing up to 30 m, and usually used for cooking. Coconut oil has a good saponification value that can be used as shampoo for hair treatment [36].

Celery (*Apium graveolens*): The main content of celery is butylphthalide known as the main aroma of celery. There are also a number of flavonoids such as graveobiosid A (1-2%) and B (0, 1-0.7%) as well as fatty acids and phenol group compounds. The main content of fatty acids acid petroselin (40-60%). In addition, the leaves and stems contain steroids as stigmasterol and sitosterol [37]. Celery is also known to have tremendous benefits in hair care because of of nutrient contents in celery such as vitamin A, vitamin B, sodium, iron and calcium.

Kemiri (*Aleurites moluccanus*): *Kemiri* seeds are used as a source of oil and spices. It has many mineral deposits such as phosphorus, calcium, potassium, magnesium, and other minerals for stimulating healthy hair, overcoming hair loss and dullness. In Tonga, until now, the mature *kemiri* (named after "tuitui") is used as a paste, soap and shampoo [38].

Skin whitening

Akar manis (*Glycyrrhiza glabra*): *Akar manis* extract is rich in natural antioxidants [39]. The main antioxidant compound in *Glycyrrhiza glabra* extract is glycyrrhizin (glycyrrhizic acid) and flavonoid [40]. The role of plant extracts on the skin is primarily associated with antioxidant [41], skin rejuvenation [42], skin lightening [43, 44] and photoprotection [45, 46]. Previous research showed that a cream formula of plant extracts *Glycyrrhiza glabra* was chemically and physically stable during storage conditions and without induction of allergic or contact dermatitis [47].

Bengkuang (*Pachyrhizus erosus*): *Bengkuang* has benefits to maintain healthier skin and remove dead skin cells. *Bengkuang* contains Vitamin C which can nourish the skin and can be used as a base material for the preparation of masks to refresh the face and brighten the skin [48].

Temulawak (*Curcuma xanthorrhiza*): *Temulawak* is a *Zingiberaceae* species that is empirically widely used as a traditional medicine especially its rhizome. Anti-acne agents and skin bleaches are an interesting subject on natural skin care of *Temulawak* because of its vitamin C content. *Temulawak* is often used as a base ingredient in cosmetic skin lightening preparations in the facial mask, lotion and face cream [49].

CONCLUSION

Herbal cosmetic in Indonesia has a long history. It had been used for health, skin and hair care. Indonesia has abundant natural plants that can be used as a source of the herbal cosmetics industry.

In Indonesia, there are many native herbal plants such as *dayak* onion bulb, *kemuning* leaf, *kecombrang*, red betel, *kemiri*, *akar manis*, etc. which can be formulated into various categories of cosmetic preparations such as antioxidants, anti-aging, lip color, liquid bath soap, hair and skin care in accordance with their contents of phytochemicals substances. Thus, cosmetics industry in Indonesia has a great opportunity to become one of the largest herbal cosmetics industries in the world.

AUTHORS CONTRIBUTIONS

All the author have contributed equally

CONFLICT OF INTERESTS

Declared none

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